

Listing of Claims

1-16. (Canceled)

17. (Currently Amended) A method for bonding laminae together to form a device, comprising:

providing a thermally assisted bonding unit comprising ~~an engager having~~ at least one fluid expansion unit;

loading laminae in the thermally assisted bonding unit;

placing the thermally assisted bonding unit and laminae in a furnace;

heating the laminae and the bonding unit in the furnace, where the laminae are heated to ± 50 °C of a bonding temperature; and

applying a bonding pressure to the bonding laminae together using the device thermally assisted bonding unit, wherein timing application of the bonding pressure is determined by adjusting fluid mass in the fluid expansion unit.

18. (Canceled)

19. (Original) The method according to claim 17 further comprising using a conveyorized furnace for applying heat to laminae functionally associated with the bonding unit.

20. (Original) The method according to claim 17 further comprising forced convective heating of the laminae, forced convective cooling of the laminae or both, using a gas.

21. (Original) The method according to claim 20 where the gas is an inert gas.

22. (Original) The method of claim 20 where the gas is contained in the unit.

23. (Original) The method according to claim 17 further comprising thermally registering plural lamina using a registration fixture prior to bonding laminae.

24. (Currently Amended) [[The]] A method according to claim 23 for bonding
laminae together to form a device, comprising:
providing a thermally assisted bonding unit comprising at least one fluid expansion unit;
thermally registering plural laminae using a registration fixture prior to bonding laminae,
where the registration fixture includes flexible laminae engagement portions that flex when
displaced by expanding laminae; and.
bonding laminae together using the device.
25. (Original) The method according to claim 24 where at least one lamina in a stack
includes a thermal registration element.
26. (Original) The method according to claim 25 where the registration element is
integral with the lamina.
27. (Original) The method according to claim 26 where integral with the lamina
comprises embedded in the lamina.
28. (Original) The method according to claim 25 where plural laminae include
registration elements.
29. (Canceled)
30. (Currently Amended) The method according to claim 29 where the thermally
assisted bonding unit further includes at least one pressure regulating spring ~~positioned between~~
~~the bottom plate and the at least one engager~~, and where laminae are positioned between the at
least one pressure regulating spring and the at least one engager fluid expansion unit.
31. (Previously Presented) The method according to claim 30 where bonding laminae
comprises applying bonding pressure stored in the at least one spring to the laminae.

32. (Currently Amended) The method according to claim 30 where bonding laminae comprises heating the thermally assisted bonding unit, the heat causing ~~the-an~~ engager to expand ~~relative to the top plate and bottom plate~~ such that at a given time after heating, the engager engages ~~both~~ the top plate and laminae.

33. (Currently Amended) The method according to claim 32 where at the time the engager engages ~~both~~ the top plate and laminae, final bonding pressure stored in the at least one spring is applied to laminae.

34. (Original) The method of claim 17 where bonding laminae comprises prebonding a first stack of at least two laminae and prebonding a second stack of at least two laminae, the first stack and the second stack being subsequently bonded together.

35. (Currently Amended) A method for bonding plural laminae together to form at least a portion of a microfluidic device, the method comprising:

providing a thermally assisted bonding device comprising a frame, a platen assembly and a load cell;

functionally associating laminae with the device; and

continuously bonding laminae together using the device and a conveyorized heating system.

36. (Original) The method according to claim 35 where bonding comprises forced convective heating, cooling or both.

37. (Original) The method according to claim 36 where convective heating and/or cooling is accomplished using forced inert gas flush.

38. (Original) The method according to claim 35 where functionally associating comprises stacking and registering the laminae on the device.

39. (Original) The method according to claim 38 where registering comprises thermally assisted registration.

40. (Original) The method according to claim 39 where thermally assisted registration comprises a registration device or lamina having a compliant registration element.

41-65 (Canceled)

66. (Previously Presented) The method according to claim 17 where the thermally assisted bonding unit has at least one pressure regulating spring functionally associated with the unit to apply pressure to the laminae.

67. (Currently Amended) The method according to claim 17 where the thermally assisted bonding unit further comprises:

a frame having a base plate, a top plate and support rods positioned between and coupling the base plate and the top plate, ~~the support rods coupling the top plate and bottom plate, with the engager fluid expansion unit being positioned between the base plate and top plate; and~~

a first platen and a second platen positioned between the at least one ~~engager fluid expansion unit~~ and the ~~bottom~~ base plate, the first platen contacting an upper surface of the laminae and the second platen contacting a lower surface of the laminae.

68. (Currently Amended) [[The]] A method according to claim 67 for bonding laminae together to form a device, comprising:

providing a thermally assisted bonding unit comprising a frame having a base plate, a top plate and support rods positioned between the base plate and the top plate, at least one fluidic expansion unit being positioned between the base plate and top plate, and a platen assembly for contacting the laminae, where the thermally assisted bonding unit further comprises comprising a load stage cell positioned between the second platen and the bottom plate; and a spring positioned between the load stage and the bottom plate; and

bonding laminae together using the device.

69. (Currently Amended) The method according to claim 68 where the thermally assisted bonding unit further comprises a gap height adjustment screw coupled to the top plate, ~~with a gap being defined between the gap height adjustment screw and the at least one engager.~~

70. (Currently Amended) The method according to claim 69 wherein the bonding unit further comprises at least one engager which expands when the unit is heated such that gap height decreases, and wherein when the gap height is zero, a compressive force is applied to the laminae.

71. (Currently Amended) The method according to claim [[69]] 70 where the thermally assisted bonding unit comprises plural engagers.

72. (New) A method for bonding laminae together to form at least a portion of a microfluidic device, comprising:

providing a bonding unit comprising a frame, a platen assembly for applying a bonding pressure to laminae, and a load cell;

placing laminae in the bonding unit;

placing the bonding unit and laminae in a furnace;

heating the laminae to ± 50 °C of a bonding temperature; and

bonding the laminae together using the thermally assisted bonding unit.

73. (New) The method according to claim 72 wherein the load cell is preloaded with a bonding pressure.

74. (New) The method according to claim 72 where the load cell is a fluidic load cell.

75. (New) The method according to claim 72 where the load cell is a spring-based load cell.